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SURVEYS OF LIQUID WASTES FROM MUNITIONS MANUFACTURING

I. TRINITROTOLUENE (TNT) WASTES

By Russell S. Smith, *Public Health Engineer*, and W. W. Walker, *Associate Sanitary Chemist, United States Public Health Service, Stream Pollution Investigations, Cincinnati, Ohio*

Many large munitions plants are being built in the United States to supply military needs under existing war conditions. Several of these plants will be manufacturing military explosives in unprecedented quantities and will discharge liquid wastes into watercourses. As there are no published data available on the quantity and character of the wastes to be expected from such manufacturing processes, the United States Public Health Service has made surveys of industrial waste at various types of plants manufacturing military explosives in order to obtain the data necessary for intelligent consideration of the effect of such wastes from any proposed plant on the receiving stream. These surveys were made by sending a mobile laboratory, built in an automobile trailer, to the plant under study. Flow measurements and samples were taken for at least seven 24-hour periods and the samples analyzed in the trailer laboratory.

In this paper, the first of a series of five reports, are presented data on industrial wastes gathered from surveys at three plants manufacturing di- and tri-nitrotoluene (DNT and TNT). The data concern only the actual liquid waste from the manufacture of this explosive. The flows from the power house areas, acid areas (where nitric acid is manufactured and sulfuric acid is reconcentrated), and any areas manufacturing other types of explosives have not been considered.

MANUFACTURING PROCESSES

The different processes in the manufacture of TNT may be summarized as follows:

(*a*) Nitration of toluene by treating it with a mixture of nitric and sulfuric acids under controlled temperature conditions. This is done in three stages, producing first mono-, then di-, and finally tri-nitrotoluene.

(*b*) Washing the product until it is free from acid.

(*c*) Graining or crystallizing.

(*d*) Purifying with sodium sulfite and washing to remove the beta- and gamma-trinitrotoluenes as water soluble sulfonates from the alpha-trinitrotoluene.

(*e*) Remelting, flaking, and packing.

A variable amount of the DNT is removed for use after the second stage of nitration, the remainder being carried to completion as TNT.

RAW MATERIALS

The principal raw materials are the toluene and the acids used in the nitration. The sulfuric acid is shipped to the plant, but the nitric acid is usually made on the plant site by the catalytic oxidation of anhydrous ammonia at high temperature and pressure. Sodium sulfite, which is used in the purification of the TNT, is usually made on the plant site by passing sulfur dioxide gas through a sodium carbonate solution.

CHARACTER OF WASTES

A plant for the manufacture of TNT consists of one or more "areas," each containing three "lines." The manufacturing is a batch process and the wastes from any one line fluctuate rapidly in appearance and character. Naturally, the larger the plant and the more areas involved, the less apparent are these fluctuations in the main waste flow.

There are two principal wastes from a plant of this type in addition to the cooling water from the nitrators, graining kettles, and the "fume recovery" or acid recovery house. These are the acid wash waters from the washing after nitration and the so-called "red water" from the sulfite purification and wash. The former is highly acid and has a decided yellow color. The red water from the purification is alkaline and has such an intense color (250,000 or more on the cobalt scale) that it appears black. As the final washings proceed, this red color fades rapidly. The acid waste and the red water are passed through catch tanks to settle out any particles of TNT that may be formed by postcrystallization as the wastes cool and then are usually mixed with the wasted cooling water for discharge to the receiving stream. If it were desirable for waste treatment purposes, the red water, either alone or with the acid wash, could be separated at the outlet of the catch tanks and piped to the treatment process, allowing the cooling water to be discharged directly to the stream. A composite sample of the waste, including the cooling water, over a period of several hours is clear, decidedly acid, and has a deep orange-red color.

FLOW MEASUREMENTS AND SAMPLING

Surveys were made in the TNT areas of three plants which are designated as plants "A," "B," and "C."

At plants "A" and "B" the waste flows were measured by means of a fully contracted rectangular weir set in an open ditch which

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carried the waste waters from the entire TNT area. The head on the weir was measured to the nearest 0.01 ft. at regular intervals and the flow computed by standard weir formulae.

In order to obtain samples as representative as possible, an automatic sampler was built and installed in the ditch, well downstream from the weir. The stream was constricted somewhat to increase the velocity of flow and a paddle wheel about 4 feet in diameter was installed to turn with the current. Mounted on the rim of the wheel were two open stainless steel or copper cups with a hole about ¼ inch in diameter in the side. As these cups passed the top of their arc, a small part of the flow from this side hole entered a trough leading to the sample container. The wheel averaged about 17 r. p. m., thus collecting approximately 2,000 samples per hour. The sample container was changed every 2 hours and the samples combined into 12-hour or 24-hour composites, either uniformly or based on the calculated flows if there was any great flow variation. Sampling was done over a 24-hour period every other day for at least 2 weeks at each plant. In this way it was possible to obtain flow measurements and analytical results representative of a full week's operation at each plant. The 12-hour composite sample periods were from 8 a. m. to 8 p. m., designated as "day," and from 8 p. m. to 8 a. m., designated as "night." All analyses were made in a trailer laboratory of the United States Public Health Service which was set up within the grounds of the munitions plants.

The volume of cooling water used will vary with its temperature. Some plants may use well water for cooling, while others will use water from surface streams. If the cooling water comes from a surface supply, its temperature will vary greatly between winter and summer. For these reasons, the volume and strength of the wastes may vary greatly from one plant to another when considering the total flow from the TNT area.

At plant "C" it was found impractical to measure and sample the entire flow from the area. It was found, however, that the combined red water and acid wash from one line could be readily measured and sampled in a wood trough downstream from the catch tanks before being mixed with the cooling water. A shallow, suppressed weir was built in this trough and weir readings and samples were taken every 10 minutes for three 24-hour periods. The red water has a very intermittent flow, being discharged for 20 to 30 minutes every hour and a half. During one period of 12 hours, the time of start and stop of this flow was noted and depth measurements were made and samples taken every minute during the discharge. Flows were computed by the Chezy formula. From these data taken at plant "C" it is possible to determine the amount and character of

the waste per unit of production that might need treatment before discharge into a stream.

ANALYTICAL DETERMINATIONS

The following laboratory determinations were made on the composite samples of the waste: pH; oxygen consumed; color; threshold odor; sulfates; acidity, both methyl red and phenolphthalein; ammonia nitrogen; nitrite nitrogen; nitrate nitrogen; total solids, volatile and ash; and suspended solids, volatile and ash. Ammonia nitrogen and nitrate nitrogen determinations were not made on the plant "B" samples.

Where possible, all determinations were made in accordance with "Standard Methods of Analysis for Water and Sewage, Eighth Edition." The pH of the waste was determined potentiometrically using the glass electrode. Oxygen consumed was determined by digestion with potassium dichromate, instead of the more customary potassium permanganate, in accordance with the general practice of the Stream Pollution Investigations laboratory. Color was determined by the use of a standard color comparator using glass standards based on the cobalt scale, the readings being obtained by dilution of the waste with distilled water to bring the color within the range of the standards. Sulfates were determined gravimetrically by precipitation with barium chloride. This procedure would also precipitate sulfites, if present, and the amounts of sulfates reported may, therefore, be unduly high at times. Owing to the color of the waste, some difficulty was experienced in getting true end points when titrating for acidity, but pH measurements after titrating showed that the end points were in fair agreement. Nitrate nitrogen was determined by the reduction method. This determination includes nitrite and ammonia nitrogen as well. The latter two were obtained separately and the nitrate nitrogen obtained by subtraction. Nitrite nitrogen was measured colorimetrically and, although interference was encountered in a few cases during the work, satisfactory results were generally obtained. Ammonia nitrogen was determined by distillation into 0.1 normal acid.

Certain customary determinations could not be made on this waste. Because of the deep orange-red color, analyses for nitrate nitrogen by the disulfonic acid method, ammonia nitrogen with Nessler's reagent, and turbidity could not be made. It was found that dissolved oxygen determinations were impossible as some components of the wastes continued to liberate iodine in the final titration, giving erroneously high results. None of the standard modifications of the Winkler method nor other preliminary treatments that were tried would eliminate this interference. B. O. D. determinations were not made as routine work because trials in the field showed no B. O. D. in concentrations up to 5 percent even though the waste was neutralized and seeded.

RESULTS AND DISCUSSION

Tables 1, 2, and 3 show the analytical results for all samples taken at each plant, together with the average, maximum, and minimum results for the individual plant. Table 3A shows the analytical results for red water alone as found at plant "C." Table 4 presents a comparison of these results for the three plants surveyed and data on the average strength of the wastes for plants of this type. Table 5 shows the pounds of waste materials per 100,000 pounds of explosive produced at the various plants. The averages given in this table are the amounts of the various waste constituents that may be expected per 100,000 pounds of explosive produced (TNT plus DNT) from a TNT manufacturing plant (exclusive of the acid manufacturing area).

TABLE 1.—*Analytical results, plant "A"*

Sample date	Sample period	pH	Color	Odor concentration	p. p. m. Acidity: Methyl red	p. p. m. Acidity: Phenolphthalein	p. p. m. Oxygen consumed	p. p. m. SO_4	p. p. m. Nitrogen: NH_3	p. p. m. Nitrogen: NO_2	p. p. m. Nitrogen: NO_3	p. p. m. Total solids: Volatile	p. p. m. Total solids: Ash	p. p. m. Suspended solids: Volatile	p. p. m. Suspended solids: Ash
1	Day	2.4	8,000	64	214	504	870	617	5.7	10	106	1,085	1,325	18	110
	Night	2.4	7,500	128	200	424	750	535	4.4	16	76	933	1,097	12	55
2	Day	2.7	6,000	32	176	416	811	587	5.9	4	92	964	1,266	24	115
	Night	2.7	7,000	32	154	445	733	569	4.9	10	92	937	1,293	23	157
3	Day	2.7	6,000	32	127	420	718	518	5.4	15	137	955	1,345	25	242
	Night	2.7	6,000	64	113	339	747	527	4.5	20	120	920	1,160	7	90
4	Day	2.4	6,500	32	219	432	840	605	8.4	13	140	990	1,490	24	206
	Night	2.4	7,500	64	233	423	798	587	5.0	26	119	903	1,267	17	118
5	Day	2.4	9,000	64	283	441	926	604	5.4	13	103	1,106	1,290	24	121
	Night	2.3	9,000	32	343	505	923	667	5.1	20	99	1,160	1,240	22	143
6	Day	2.5	7,000	32	261	400	820	562	4.5	11	110	960	1,320	37	249
	Night	2.4	6,000	32	304	428	738	554	3.8	19	90	852	1,188	20	144
7	Day	2.0	7,500	64	623	783	702	806	5.9	14	124	1,090	1,250	31	135
	Night	2.0	7,000	32	676	823	759	972	5.7	24	88	1,190	1,300	25	128
Average		2.4	7,100	70	291	485	795	672	5.3	15	107	1,004	1,273	22	144
Maximum		2.7	9,000	128	676	823	926	972	8.4	26	137	1,190	1,490	37	249
Minimum		2.0	6,000	32	113	339	702	518	3.8	4	76	852	1,097	7	55

Table 4 reveals that there is a great difference in the strength of the wastes at different plants. Acidity, oxygen consumed, and volatile solids all show that the waste from plant "A" is considerably stronger than the waste from plant "B." Table 5 shows that the actual amounts of waste per unit of product were higher at "A" than at "B." The difference might be due to the fact that "A" was being operated at somewhat more than rated capacity, while "B" was slightly under capacity.

Waste flows at "B" were relatively considerably lower than at "A." This may be due to the fact that the water supply at "B" is

TABLE 3A.—*Red water only, plant "C" (from catch tank)*

Table 2.—*Analytical results, plant "B"*

Sample date	Sample period	pH	Color	Odor concentration	p. p. m. Acidity: Methyl red	Acidity: Phenolphthalein	Oxygen consumed	SO_4	Nitrogen: NH_3	Nitrogen: NO_2	Nitrogen: NO_3	Total solids: Volatile	Total solids: Ash	Suspended solids: Volatile	Suspended solids: Ash
1	Day	2.8	6,750	16	100	133	738	668	----	23	----	826	1,290	14	12
	Night	2.8	8,000	16	87	115	730	652	----	32	----	907	1,236	----	----
2	Day	2.4	4,000	32	259	291	557	706	----	14	----	597	1,103	6	6
	Night	2.5	3,500	16	166	187	464	560	----	15	----	573	947	6	5
3	Day	2.8	8,500	8	112	162	543	563	----	12	----	620	1,060	13	7
	Night	2.6	7,000	8	183	218	550	622	----	24	----	678	1,082	9	4
4	Day	2.8	------	8	121	162	494	570	----	14	----	554	1,116	20	36
	Night	2.6	------	16	171	254	454	641	----	13	----	633	1,192	10	1
5	Day	2.5	5,500	8	204	280	498	733	----	25	----	573	1,270	20	31
	Night	2.6	4,750	8	151	205	516	594	----	22	----	728	1,090	11	4
6	Day	2.8	4,500	16	117	187	564	577	----	16	----	590	1,100	18	39
	Night	2.8	3,500	16	132	166	558	569	----	14	----	675	1,065	8	10
7	Day	3.1	6,000	32	56	121	620	590	----	20	----	760	1,163	24	29
	Night	3.2	7,000	16	61	120	618	558	----	----	----	836	1,100	17	3
8	Day	2.6	9,000	16	183	228	578	658	----	22	----	730	1,220	19	19
	Night	2.8	7,500	16	----	143	490	564	----	25	----	590	1,080	9	26
9	Day	2.9	8,000	16	90	119	435	526	----	20	----	730	1,070	14	9
	Night	2.8	7,000	16	92	125	506	497	----	21	----	750	1,060	17	20
Average		2.7	6,300	16	134	178	551	604	----	20	----	686	1,136	14	15
Maximum		3.2	9,000	32	259	291	738	733	----	32	----	907	1,290	24	39
Minimum		2.4	3,500	8	56	115	435	497	----	12	----	554	1,060	6	1

Table 3.—*Analytical results, plant "C" (concentrated waste from catch tanks)*

Sample date	Sampe period	pH	Color	Odor concentration	p. p. m. Acidity: Methyl red	Acidity: Phenolphthalein	Oxygen consumed	SO_4	Nitrogen: NH_3	Nitrogen: NO_2	Nitrogen: NO_3	Total solids: Volatile	Total solids: Ash	Suspended solids: Volatile	Suspended solids: Ash
1	24 hr	1.1	23,000	8	4,300	4,670	1,110	2,660	30	75	399	8,270	5,540	475	18
2	do	1.3	34,000	8	2,530	2,720	958	2,600	26	55	279	5,410	4,380	21	0
3	do	1.2	46,000	16	2,860	3,000	1,104	3,509	27	55	253	5,570	4,990	12	0
Average		1.2	34,000	11	3,230	3,460	1,057	2,923	28	62	310	6,417	4,970	169	6
Maximum		1.3	46,000	16	4,300	4,670	1,110	3,509	30	75	399	8,270	5,540	475	18
Minimum		1.1	23,000	8	2,530	2,720	958	2,600	26	55	253	5,410	4,380	12	0
Average 2 and 3		1.2	40,000	12	2,695	2,860	1,031	3,055	27	55	266	5,490	4,685	17	0

Note.—During first sampling day the catch tanks were cleaned and an unusual amount of suspended solids appeared in the waste.

TABLE 3A.—*Red water only, plant "C" (from catch tank)*

pH	Color	Odor concentration	p. p. m.										
			Acidity		Alkalinity (methyl orange)	Oxygen consumed	SO_4	Nitrogen		Total solids[1]		Suspended solids	
			Methyl red	Phenol-phthalein				NH_3	NO_2+NO_3	Volatile	Ash	Volatile	Ash
8.0	190,000	2	----	------	711	4,480	5,096	9.5	1,082	21,750	12,710	15	0

[1] Exploded on ignition; some of the ash lost.

TABLE 4.—*Average of analytical results*

Plant	pH	Color	Odor concentration	p. p. m.										
				Acidity		Oxygen consumed	SO_4	Nitrogen			Total solids		Suspended solids	
				Methyl red	Phenol-phthalein			NH_3	NO_2	NO_3	Volatile	Ash	Volatile	Ash
"A"	2.4	7,100	70	291	485	795	672	5.3	15	107	1,004	1,273	22	144
"B"	2.7	6,300	16	134	178	551	604	----	20	----	686	1,123	14	15
Average ("A" & "B")	2.6	6,700	43	212	332	673	638	5.3	18	107	850	1,198	18	80
"C" (no cooling water)	1.2	34,000	11	3,230	3,460	1,057	2,923	2.8	62	310	5,490	4,685	17	0

TABLE 5.—*Waste quantities*

	Waste per 100,000 pounds of explosive produced (TNT and DNT)			
	Plant "A"	Plant "B"	Plant "C"	Average
Flow ... million gallons	1.17	1.08	--------	1.12
Free mineral acid as H_2SO_4 ... pounds	2,070	1,210	3,140	2,140
Sulfates ... do	5,560	5,450	2,840	4,620
NH_3 nitrogen ... do	49.7	--------	27.2	38.5
NO_2 nitrogen ... do	140	179	60	116
NO_3 nitrogen ... do	1,062	--------	302	684
Oxygen consumed ... do	8,360	4,990	1,055	4,800
Total solids:				
Volatile ... do	9,460	6,180	6,440	7,360
Ash ... do	12,240	10,220	4,980	9,150
Suspended solids:				
Volatile ... do	200	118	170	163
Ash ... do	1,380	130	6	505

from surface streams and the water temperatures were very low during the winter when the survey was made. It is expected that the flow per unit of product at plant "B" would increase considerably during the warm summer months.

As previously mentioned, the results at plant "C" are from sampling the concentrated wastes before they were diluted with the cooling

normally used in water treatment and can only be reduced or elim-

water. At a plant where it was considered necessary to treat the wastes before discharging them into a stream, these concentrated wastes could be readily collected separately and the uncontaminated cooling waters discharged without treatment. The survey showed that these concentrated wastes would average 117,000 gallons per 100,000 pounds of explosive. If it should be found possible to pass the yellow acid wash into the stream and treat only the "red water" or Sellite (sodium sulfite) wash, it would reduce the volume of waste to be treated to approximately 60,000 gallons per 100,000 pounds of explosive. Table 6 shows the pounds of waste products per 100,000 pounds of explosive that may be expected in the "red water."

TABLE 6.—*Waste quantities (red water only)*

	Waste per 100,000 pounds of explosive produced		Waste per 100,000 pounds of explosive produced
Flow .... million gallons	0.0306	Total solids:	
Sulfates .... pounds	1,300	Volatile .... pounds	5,530
NH_3 nitrogen .... do	2.4	Ash .... do	3,240
NO_2 nitrogen .... do	276	Suspended solids:	
NO_3 nitrogen .... do		Volatile .... do	4
Oxygen consumed .... do	1,140	Ash .... do	0

Tests were made at the National Institute of Health, United States Public Health Service, Bethesda, Md., of the toxicity of the concentrated waste as obtained from plant "C." The waste was brought to a pH of 7, made isotonic with sodium chloride, and sterilized in an autoclave for 1 hour. Two mice were each given a ½-ml. intraperitoneal injection of the sterilized waste and a guinea pig was given 2 ml. intraperitoneally. A rabbit was given an intravenous injection of 15 ml. and observed for any temperature rise. All results were negative and the animals showed no ill effects from the different injections. Apparently the waste is nontoxic to warm-blooded animals.

SUMMARY

Waste surveys were made at three plants manufacturing trinitrotoluene. Tables present the average concentration of various constituents of the wastes for plants of this type and the average amounts of various constituents of the wastes to be expected per unit of product.

The waste is generally clear, highly colored, strongly acid, and a high percentage of the solids present are volatile. It has a noticeable chemical odor and a taste best described as "acid." Apparently it is very stable. It does not readily decompose in the stream, nor does it seem to combine with other materials to be found in the normal stream used for water supply to intensify taste and odor troubles. The color apparently cannot be removed by means of coagulation methods

normally used in water treatment and can only be reduced or eliminated by means of adequate dilution. The waste in a concentration of ½ percent in filtered and chlorinated Ohio River water gave no odor and a barely perceptible "acid" taste. There was, however, a very noticeable increase in color. The waste is apparently nontoxic to warm-blooded animals.

II. SMOKELESS POWDER WASTES

By Russell S. Smith, *Public Health Engineer*, and W. W. Walker, *Associate Sanitary Chemist, United States Public Health Service, Stream Pollution Investigations, Cincinnati, Ohio*

This paper presents data on industrial wastes gathered from a survey of three plants manufacturing smokeless powder for use as a propellant.

MANUFACTURING PROCESSES

The different processes used in the manufacture of nitrocellulose (pyro smokeless) powder may be summarized as follows:

(*a*) Nitration of purified cotton linters by treating with a mixture of nitric and sulfuric acids to produce a cellulose nitrate or "pyrocotton."
(*b*) Purification of pyrocotton by boiling, macerating, and washing to remove all traces of free acids, unnitrated cellulose, nitrated oxy- and hydrocellulose, and cellulose sulfate.
(*c*) Mixing of pyrocotton with ether-alcohol and a stabilizer and pressing to form a colloid.
(*d*) Granulating of the powder by pressing the colloid through steel dies.
(*e*) Final processes of solvent recovery, drying, and blending.

The completed powder is shipped to other locations for loading into silk bags, cartridges, and field artillery shells.

RAW MATERIALS

The principal raw materials used in the process are cotton, nitric acid, sulfuric acid, and alcohol. The cotton is received at the plant as purified cotton linters, the cotton having been purified elsewhere by digesting, washing, and bleaching. The sulfuric acid is shipped to the plant and the nitric acid is made on the plant site by the catalytic oxidation of ammonia at high temperature and pressure. Both methyl and ethyl alcohols are used. The methyl alcohol is used to make methylamine and the ethyl alcohol for dehydration of pyrocotton and for the manufacture of ether for use in colloiding.

Other raw materials used in smaller amounts include diphenylamine used as a stabilizer, caustic soda used for scrubbing in the ether production and for neutralization in the production of diphenylamine, and soda ash used for neutralization in the process of powder production. The diphenylamine is made at the plant from benzene.

CHARACTER OF WASTES

There are four principal wastes from a plant producing smokeless powder. These are: (1) the acid that is lost from the wringers after nitrating the cotton and purifying the pyrocotton; (2) gun cotton lost in white water from the boiling and poaching; (3) alcohol wastes slightly contaminated with ether lost from the solvent recovery and the water dry; and (4) aniline from the manufacture of diphenylamine. The white water from the boiling and poaching tubs and the beaters is recirculated through a "save-all" or settling tank, thus reducing the cotton losses. The aniline is settled out with an iron sludge in a separate basin and the sludge removed and sent to aniline manufacturers for aniline recovery. There are also the cooling, condensing, and ash sluicing waters from the power house and acid manufacturing area, but these may usually be separated from the other wastes, put through a pond to settle out the ash, and then admitted to the receiving stream essentially as an uncontaminated flow.

Engineers of the du Pont Company have stated that the wastes mentioned above would represent losses of approximately 89,500 pounds of acid (mixed sulfuric and nitric), 2,500 pounds of alcohol, and 125 pounds of cotton per 100,000 pounds of powder produced and that the waste flow, including cooling and condensing water, would be 8.3 million gallons per 100,000 pounds of powder. It was also stated that if all the aniline escaped from the iron sludge it would amount to 23 pounds per 100,000 pounds of powder.

FLOW MEASUREMENTS AND SAMPLING

When the survey was made at plant "A" the entire plant was not in operation and no diphenylamine was being manufactured, but it was felt that results obtained would be fairly representative of normal plant operation. The waste water from the power house (condensing and ash sluicing flows) was diverted to a different watercourse from the manufacturing wastes and was not included in the survey. It was estimated by the plant operating officials that this power house flow amounted to about 3 million gallons per 100,000 pounds of powder, but no measurements were available. A fully contracted rectangular weir was installed in a ditch carrying the entire waste flow of the plant. Samples were taken and the head on the weir was read every 40 minutes over a 24-hour period every other day for 2 weeks. The individual samples were made into 24-hour composite samples for the laboratory. Flows were computed from the individual weir readings and averaged to obtain the daily flow.

At plant "B" the waste flow was divided into several sewers and it was necessary to establish eight sampling and measuring points. The sewers varied in size from 12″ to 48″ and were generally on steep grades with a high velocity of flow. Due to the conditions encoun-

tered, it was considered inadvisable to try to construct weirs and all flows were computed from the size and slope of the sewer and the depth of flow. Samples were taken and flow measurements were made every 90 minutes at each sampling point every other day for 2 weeks. The individual samples were composited on the basis of flow into a 24-hour sample for each sampling point and these samples composited into a 24-hour sample for the entire plant on the basis of the average flow at the individual sampling points. The analytical results as recorded are from these "plant" samples.

At plant "C" the wastes from the power house-acid manufacturing area, the nitrocotton or pyrocotton area, and the finishing area were discharged into separate sewers. This complete separation of wastes from various parts of the plant made it practicable to make determinations of the individual wastes, which was not done at the other plants. Sufficient samples were taken of the waste from the power house-acid area to be certain that it was essentially cooling water without serious contamination that could be discharged into the ordinary stream without damage. A few flow measurements were made in order to make an estimate of the flow per unit of production.

Depth measurements were made in and samples taken from the sewer from the pyrocotton area every 20 minutes every other day for over 2 weeks. Flows were computed by the Chezy formula and the individual samples composited on the basis of measured flows into 24-hour samples. A fully contracted weir with a 7-foot crest and an automatic paddle wheel sampler were installed in the ditch carrying the discharge from the finishing area. Weir readings were taken every 3 hours and the 3-hour samples composited according to flow into 24-hour composite samples every other day over a period of 2 weeks. All analyses were made on the 24-hour samples.

ANALYTICAL DETERMINATIONS

All of the analytical work was done in a trailer laboratory of the United States Public Health Service. The following laboratory determinations were made on the composite samples: pH; color; odor concentration; acidity, methyl red and phenolphthalein; 5-day biochemical oxygen demand (B. O. D.); oxygen consumed; sulfates; nitrite nitrogen; nitrate nitrogen; total solids, volatile and ash; suspended solids, volatile and ash; and soap hardness.

Where possible, all determinations were made in accordance with "Standard Methods of Analysis for Water and Sewage, Eighth Edition." Oxygen consumed was determined by digestion with potassium dichromate, instead of the more customary potassium permanganate, in accordance with the general practice of the Stream Pollution Investigations laboratory. Color was determined by use of a standard color comparator using glass standards based on the

cobalt scale. Sulfates were determined gravimetrically by precipitating with barium chloride. All B. O. D. determinations were made on samples neutralized and then seeded with river water.

Determinations of color, odor concentration, total solids, and soap hardness were not made at plant "A" during this survey. However, some samples taken at a later date, when the plant was in nearly complete operation, showed an average color of 228 and odor concentration of 180.

RESULTS AND DISCUSSION

Tables 1, 2, 3A, and 3B show the analytical results for the 24-hour composite samples at the three plants studied. Table 4 presents a ready comparison of the averages of the analytical results obtained at the different plants.

TABLE 1.—*Analytical results, plant "A"*

Sampling day	pH	p. p. m.								
		Acidity		5-day B.O.D.	Oxygen consumed	SO_4	Nitrogen		Suspended solids	
		Methyl red	Phenolphthalein				NO_2	NO_3	Volatile	Ash
1	<1.6	2,460	2,540	57.6	74.8	1,761	1.00	500	30	39
2	<1.6	1,830	2,110	[1] 1.9	71.6	1,325	5.00	200	24	22
3	<1.6	2,400	2,440	43.6	72.8	1,609	2.00	600	24	23
4	1.6	1,670	1,790	51.2	81.0	1,156	2.20	600	26	19
5	1.7	1,280	1,680	37.2	75.9	1,053	2.20	600	42	18
6	<1.6	1,340	1,680	62.8	78.7	1,025	4.00	600	25	13
7	<1.6	1,350	1,660	42.4	78.6	1,033	2.30	600	31	33
Average	<1.6	1,860	1,990	49.1	76.2	1,280	2.70	530	29	24
Maximum	1.7	2,460	2,540	62.8	81.0	1,761	5.00	600	42	39
Minimum	<1.6	1,280	1,660	37.2	71.6	1,025	1.00	200	24	13

[1] Not included in average.

TABLE 2.—*Analytical results, plant "B"*

Sampling day	pH	Color	Odor concentration	p. p. m.											
				Acidity		5-day B. O. D.	Oxygen consumed	SO_4	Nitrogen		Total solids		Suspended solids		Soap hardness
				Methyl red	Phenolphthalein				NO_2	NO_3	Volatile	Ash	Volatile	Ash	
1	<1.6	45	16	1,990	2,130	57.0	152.0	1,422	1.5	600	430	490	70	375	322
2	<1.6	60	32	1,740	1,640	50.0	89.0	1,138	2.2	600	1,340	140	66	23	163
3	<1.6	35	64	1,290	1,380	[1] 813+	94.4	967	1.8	400	945	425	33	31	224
4	<1.6	70	16	1,880	1,960	49.2	106.0	1,460	2.6	450	175	585	52	40	478
5	<1.6	----	4	1,280	1,560	52.1	111.0	930	1.5	320	674	506	86	341	198
6	<1.6	45	8	1,820	1,950	44.9	105.0	1,275	2.0	540	200	270	52	149	193
7	<1.6	45	32	1,910	1,800	50.1	92.8	1,260	2.4	600	545	320	35	72	288
8	<1.6	70	8	1,130	1,240	44.3	90.0	860	2.0	520	1,080	300	49	160	171
9	1.7	50	8	810	848	33.7	58.4	590	1.5	200	796	154	33	36	132
Average	<1.6	53	21	1,540	1,610	47.6	99.8	1,100	1.9	470	687	354	54	136	241
Maximum	1.7	70	64	1,990	2,130	57.0	152.0	1,460	2.6	600	1,340	585	86	375	478
Minimum	<1.6	35	4	810	848	33.7	58.4	590	1.5	200	175	140	33	23	132

[1] Not included in average.

Table 3A.—*Analytical results, plant "C", pyrocotton area*

Sampling day	pH	p. p. m.: Color	Odor concentration	Acidity: Methyl red	Acidity: Phenol-phthalein	5-day B. O. D.	Oxygen consumed	SO_4	Nitrogen: NO_2	Nitrogen: NO_3	Total solids: Volatile	Total solids: Ash	Suspended solids: Volatile	Suspended solids: Ash	Soap hardness
1	1.4	50	4	2,580	3,080	31.7	118	2,105	1.5	600	2,900	1,110	48	4	1,500
2	1.2	40	4	3,430	3,500	43.8	86	2,208	2.4	700	3,060	250	31	10	341
3	1.2	30	8	3,950	4,130	59.4	98	2,540	2.1	850	3,420	220	29	5	368
4	0.9	45	4	6,200	6,330	54.7	104	2,210	3.0	1,000	5,932	248	31	6	322
5	1.0	35	2	4,450	4,520	75.8	119	1,800	2.8	1,200	3,604	196	31	4	299
6	1.0	30	4	5,190	5,290	40.8	93	2,600	4.0	900	4,710	300	23	8	622
7	0.9	30	2	5,160	5,290	59.9	109	2,680	3.2	1,500	4,777	243	25	15	511
8	1.3	25	1	3,050	3,080	52.8	118	1,970	2.0	1,000	3,010	200	78	6	248
Average	1.1	36	3.6	4,250	4,400	52.3	106	2,265	2.6	970	3,930	346	37	7	526
Maximum	1.4	50	8	6,200	6,330	75.8	119	2,680	4.0	1,500	5,932	1,110	78	15	1,500
Minimum	0.9	25	1	2,580	3,080	31.7	86	1,800	1.5	600	2,900	196	23	4	248

Table 3B.—*Analytical results, plant "C", finishing area*

Sampling day	pH	p. p. m.: Color	Odor concentration	Acidity	Alkalinity (methyl orange)	5-day B. O. D.	Oxygen consumed	SO_4	Nitrogen: NO_2	Nitrogen: NO_3	Total solids: Volatile	Total solids: Ash	Suspended solids: Volatile	Suspended solids: Ash	Soap hardness
1	8.2	70	64	......	66	59.3	52	$<$1.0	2.2	30	72	118	13	16	51
2	8.4	100	16	......	67	68.6	51	$<$1.0	3.2	9	50	140	14	70	54
3	8.9	110	16	......	80	83.4	66	$<$1.0	2.8	6	66	120	11	25	77
4	8.0	110	16	......	86	59.5	44	$<$1.0	1.0	3	61	122	15	22	52
5	8.9	110	64	......	80	77.0	56	$<$1.0	2.8	6	94	108	14	13	48
6	8.7	105	32	......	74	65.6	58	$<$1.0	3.2	6	86	132	15	20	48
7	6.8	120	8	......	43	62.8	42	8.0	1.4	4	52	118	13	31	38
8	7.9	110	16	......	47	195.0	124	$<$1.0	2.0	5	67	115	10	13	35
Average	8.2	104	29	......	68	83.9	62	1.0	2.3	9	69	122	13	26	50
Maximum	8.9	120	64	......	86	195.0	124	8.0	3.2	30	94	140	15	70	77
Minimum	6.8	70	8	......	43	59.3	42	$<$1.0	1.0	4	50	108	10	13	35

Table 4.—*Average analytical results*

Plant	pH	p. p. m.: Color	Odor concentration	Acidity: Methyl red	Acidity: Phenol-phthalein	5-day B. O. D.	Oxygen consumed	SO_4	Nitrogen: NO_2	Nitrogen: NO_3	Total solids: Volatile	Total solids: Ash	Suspended solids: Volatile	Suspended solids: Ash	Soap hardness
"A"	$<$1.6	----	----	1,860	1,990	49.1	76.2	1,280	2.7	530	------	----	29	24	-----
"B"	$<$1.6	53	21	1,540	1,610	47.6	99.8	1,100	1.9	470	687	354	54	136	241
"C"—combined flow	-----	52	----	2,820	2,970	62.9	91.4	1,512	2.4	650	2645	229	29	13	368
"C"—pyrocotton	1.1	36	4	4,250	4,400	52.3	106.0	2,265	2.6	970	3,930	346	37	7	526
"C"—finish	8.2	104	29	------	------	83.9	62.0	1	2.3	9	69	122	13	26	50

As previously mentioned, at plant "C" the wastes from the pyrocotton area and the finishing area were discharged separately. The results of the analyses of these wastes as given in tables 3A and 3B show that the waste from the finishing area would not be a serious problem from the viewpoint of possible stream pollution. The waste has a 5-day B. O. D. that is lower than that of the effluents of many plants which give only primary treatment to domestic sewage. Unless this waste would constitute a large portion of the total flow in the receiving stream it would seem unnecessary to give it any treatment. If treatment should be needed, it could probably be done successfully on trickling filters. The waste from the pyrocotton area is strongly acid and in most cases would require neutralization before discharge into a stream.

The averages of the analytical results as given in table 4 show a reasonable agreement among the different plants. It is to be noted, however, that there is a wide variation from day to day in the results at any one plant. Although not shown on these tables, there is a considerable variation in the average daily flow from these plants. These variations in quantity and strength of the wastes are much more noticeable in the individual samples taken during the course of a day than in the composite samples. This variation is shown by the following data obtained at plant "A":

Sampling time	Methyl red acidity, p. p. m.	Relative flow	Sampling time	Methyl red acidity, p. p. m.	Relative flow
7 a. m.	206	1.00	11 a. m.	790	1.12
7:40 a. m.	231	1.33	11:40 a. m.	1,340	1.33
8:20 a. m.	262	1.40	12:20 p. m.	1,350	1.40
9 a. m.	42	1.73	1 p. m.	690	1.69
9:40 a. m.	161	1.09	1:40 p. m.	530	2.04
10:20 a. m.	586	1.60			

At plant "C" samples of the flow from the pyrocotton area taken at 5-minute intervals from 8:50 a. m. to 12:45 p. m. showed a variation in methyl red acidity from 2,470 p. p. m. to 4,640 p. p. m. with an average of 3,370 p. p. m. These results clearly indicate the advisability of providing an adequate lagoon or balancing pond in connection with any treatment plant installed for the neutralization of the acid wastes from the pyrocotton area. In case neutralization before discharge is not considered necessary, such a balancing pond would help to eliminate sudden flushes of strong acid that might be harmful to the receiving stream.

Table 5 shows the waste quantities per unit of production for the three plants. It is very noticeable that the waste quantities per unit of production are much higher at plant "C" than at the other two plants. This is particularly true for the quantity of acid lost

and those items, such as sulfates and nitrate nitrogen, that would vary with the amount of acid in the waste. Production figures show that plant "C" used more acid per pound of powder produced than did plant "B." The reason for this variation is not known.

TABLE 5.—*Waste quantities*

	Waste per 100,000 pounds of powder produced			
	Plant "A"	Plant "B"	Plant "C"	Average
Flow .... million gallons	4.68	4.18	7.25	5.37
Free mineral acid as H_2SO_4 .... pounds	77,300	53,900	169,000	100,000
Sulfates .... do	49,800	38,400	91,300	59,800
Nitrite nitrogen .... do	105	66	152	108
Nitrate nitrogen .... do	20,800	16,400	39,400	25,500
Total solids:				
Volatile .... do	....	24,000	158,000	91,000
Ash .... do	....	12,340	15,900	14,200
Suspended solids:				
Volatile .... do	1,130	1,880	1,800	1,600
Ash .... do	900	4,740	815	2,150
Oxygen consumed .... do	2,970	3,480	5,520	3,990
5-day B. O. D. .... do	1,880	1,660	3,840	2,460
Population equivalent (B. O. D.)	11,100	9,760	22,600	14,500
Total hardness as $CaCO_3$ .... pounds	....	8,400	21,600	15,000

SUMMARY

Waste surveys were made at three plants manufacturing smokeless powder. Tables present the average concentrations of various constituents of the wastes for plants of this type and the average amounts of these waste products to be expected per unit of product.

Plants of this type have a very large volume of liquid waste. This waste is very strongly acid and high in sulfates and nitrate nitrogen. Except for this acidity, the waste would have less deleterious effect on the receiving stream than the same volume of domestic sewage that had received primary treatment.

TWENTY-YEAR SURVIVAL OF VIRULENT *BACILLUS PESTIS* CULTURES WITHOUT TRANSFER [1]

By EDWARD FRANCIS, *Medical Director (Retired), United States Public Health Service*

The present paper concerns a strain of *Bacillus pestis* which retained viability and virulence during 20 years of storage at 10° C. on the slanted surface of beef infusion agar tubes without transfer. The strain P 4–7 was originally isolated from a California ground squirrel (*Citellus beecheyi*) at the plague laboratory of the United States Public Health Service in San Francisco, from which it was received December 11, 1922, at the National Institute of Health, in Washington, D. C.

During 1923 and 1924 the strain was passed through guinea pigs in

[1] From the Division of Infectious Diseases, National Institute of Health.

Washington every 2 or 3 months. At time of each guinea pig passage a culture was isolated by inoculating a few drops of heart blood to the slanted surface of plain beef infusion agar having water of condensation. Each tube thus inoculated was subcultured a few days later to a plain beef infusion agar slant which in turn was subcultured to a third slant, all bearing water of condensation. Thus one-third of the tubes bore the inoculation blood and two-thirds were free from blood but the presence or absence of blood did not affect the longevity of cultures. After growth appeared, the cotton stoppers were discarded and each tube was forcibly plugged with a tight-fitting cork stopper soaked in a hot mixture of half paraffin and half vaseline heated in an open dish to the boiling point of about 250° C. This prevented any evaporation and allowed the water of condensation to remain undiminished 20 years. Forty-eight tubes of the P 4–7 strain were stored at 10° C. in 1923 and 40 in 1924 (the 1924 series awaits test in some future year).

SURVIVAL AFTER 20 YEARS OF STORAGE

On April 23, 1943, the 48 tubes of the 1923 series were subcultured each to a horse meat infusion agar slant, of which 33 showed growth in 2 to 7 days, while 15 failed to grow. The growths from the 33 positive tubes were tested for virulence by injection, each into a guinea pig subcutaneously on the abdomen using a loopful of solid growth for each pig. The results follow: (1) Eleven of the 33 pigs survived and were killed at the end of 2 weeks without having shown effects greater than slight thickening at the site of inoculation or slight enlargement of inguinal lymph nodes. (2) Thirteen died near the end of the first week without showing significant gross change in spleen nor caseation of inguinal lymph nodes. (3) Three were found dead near the end of the first week, showing lesions of acute plague, i. e., edema, hemorrhage and necrosis at site of inoculation, enlarged spleen studded throughout with focal necroses, enlarged caseous inguinal glands, and great numbers of bipolar typical *B. pestis* in smears of spleen and glands. (4) Six were killed for culturing when dying near the end of the first week and *B. pestis* was isolated from the heart blood of each. Their sites of inoculation, spleens, and inguinal glands showed typical gross lesions of acute plague and great numbers of *B. pestis* in smears.

SURVIVAL AFTER 10 YEARS OF STORAGE

Culture tube No. 44 of the 1923 series of strain P 4–7, when tested by Francis (*1*) in 1932 after 9 years of storage without transfer, was found to grow readily on beef infusion agar, to give the sugar fermentations typical of plague, and to be of maximum virulence for guinea pigs and white rats.

Cultures of four other strains (Hill 1932, Ruiz 1933, Lakeview 1934, and Siam 1939) were stored at 10° C. at time of isolation on beef infusion agar slants and were subcultured for the first time in April 1943 on horse meat infusion agar slants. All grew in 48 hours; their sugar fermentations were unchanged since original isolation and were typical of plague. The virulence for guinea pigs of Ruiz after 10 years, Lakeview after 9 years, and Siam after 4 years was maximum while the Hill strain was nonvirulent after 11 years.

Wilson (*2*) reported a plague culture as viable and virulent after remaining unopened for 10 years and 5 months.

TABLE 1.—*Virulence of plague cultures stored at 10° C.*

Strain	Date of isolation	Animal source	Place of origin	By whom isolated	Killed guinea pigs in days	Years since last transfer
P 4-7	June 10, 1923	California ground squirrel.	California	Plague Laboratory, San Francisco.	4, 5, 6, 7, 8, 9	9
					4, 5, 6, 6, 7, 8	20
Hill	Apr. 8, 1932	Norway rat	Los Angeles	L. V. Dieter	nonvirulent	11
Ruiz	Aug. 4, 1933	Man	Peru	E. Francis	4, 5, 5, 7, 7, 8	10
Lakeview	May 21, 1934	do	Oregon	W. Levin	5, 6, 6, 6, 7, 7	9
Siam	July 26, 1939	Unknown	Siam	E. Francis	5, 6, 6, 7, 7	4

Acute virulence as recorded in table 1 consisted of severe local edema at site of inoculation, caseation of enlarged inguinal lymph nodes, and small nodules of focal necrosis studded over the spleen. Smears of the lesions showed typical bipolar bacilli, and cultures from heart blood yielded *B. pestis*.

Fermentation of sugars.—The sugar reactions of the five strains were uniform but glycerin was fermented only by the Siam strain. The latter arrived at Washington on July 26, 1939, by air mail from Bangkok, Siam, in a guinea pig spleen in 20 percent glycerin. The original source of the strain was not stated but at that time 89 cases of plague were reported from Siam. Fermentation tests were made in the semisolid medium proposed by Enlows (*3*) which is composed of water, peptone, potassium and sodium salts, agar 0.15 percent, brom thymol blue as an indicator, and the fermentable substance.

The fermentation reactions were as follows: (1) Fermentation with production of acid but no gas in dextrose, levulose, mannose, mannitol, xylose, trehalose, salicin, maltose, and galactose; (2) slight fermentation of arabinose, dextrin, and starch; (3) no fermentation of saccharose, lactose, amygdalin, dulcitol, erythritol, inositol, inulin, raffinose, rhamnose, sorbitol, adonitol or litmus milk; gelatin was not liquefied.

CONCLUSION

Bacillus pestis retained viability and virulence for 10 and 20 years on slants of beef infusion agar stored at approximately 10° C. without transfer.

REFERENCES

(1) Francis, Edward: Duration of viability and virulence of *Bacillus pestis*. Pub. Health Rep., **47**: 1287–1294 (June 10, 1932).

(2) Wilson, R. J.: The viability of the *Bacillus pestis* in stock cultures. Proceedings of the New York Pathological Society, **13**: 149–150 (December 1913).

(3) Enlows, E. M. A.: A sugar-free medium for fermentation studies. Pub. Health Rep., **38**: 2129–2132 (September 14, 1923).

DEATHS DURING WEEK ENDED AUGUST 28, 1943

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Aug. 28, 1943	Corresponding week, 1942
Data from 90 large cities of the United States:		
Total deaths	7,784	7,400
Average for 3 prior years	7,287	
Total deaths, first 34 weeks of year	315,665	288,331
Deaths under 1 year of age	632	613
Average for 3 prior years	547	
Deaths under 1 year of age, first 34 weeks of year	22,495	19,316
Data from industrial insurance companies:		
Policies in force	65,764,051	64,982,742
Number of death claims	10,974	10,061
Death claims per 1,000 policies in force, annual rate	8.7	8.1
Death claims per 1,000 policies, first 34 weeks of year, annual rate	10.0	9.4

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED SEPTEMBER 4, 1943

Summary

The incidence of poliomyelitis increased to a total of 956 cases for the current week, as compared with 872 for the preceding week and a 5-year (1938–42) median of 479. The current total is higher than that for the corresponding week of any other year since 1935, when 1,088 cases were reported—the peak week of that year. States reporting the largest numbers currently (last week's figures in parentheses) are as follows: *Increases*—Kansas 90 (66), Utah 76 (13), New York 58 (42), Connecticut 44 (39), Iowa 33 (13), Missouri 30 (24), Massachusetts 20 (8); *decreases*—Illinois 192 (194), California 114 (138), Texas 62 (75), Colorado 20 (21).

The cumulative total for the first 35 weeks of the year is 5,887, as compared with 1,902 for the same period of last year and a 5-year median of 3,009. The total for the first 35 weeks of 1935 was 5,417, or 50 percent of the total for that year.

A total of 151 cases of meningococcus meningitis was reported, as compared with 166 for the preceding week and a 5-year median of 26. The largest number recorded for a corresponding week of the past 16 years was 87 cases, reported in 1930. The largest numbers reported currently (last week's figures in parentheses) are as follows: New York 19 (25), Pennsylvania 14 (18), California 14 (15), Michigan 13 (7), and Illinois 12 (8). The cumulative total for the first 35 weeks of the year is 13,845, as compared with 2,495 for the same period last year and a 5-year median of 1,470.

The incidence of diphtheria, influenza, measles, typhoid and paratyphoid fever, and whooping cough was slightly below that for the preceding week, while the figures for scarlet fever were slightly higher (821 cases, as compared with 767 last week and a 5-year median of 683). Only 7 cases of smallpox were reported, as compared with none last week and a 5-year median of 16.

Deaths recorded in 89 large cities of the United States totaled 7,812, as compared with 7,754 for the preceding week and 7,472 for the average of the past 3 years. The cumulative figure for the first 35 weeks of the year is 322,451, as compared with 294,979 for the same period last year.

(1383)

Telegraphic morbidity reports from State health officers for the week ended September 4, 1943, and comparison with corresponding week of 1942 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended		Median 1938–42	Week ended		Median 1938–42	Week ended		Median 1938–42	Week ended		Median 1938–42
	Sept. 4, 1943	Sept. 5, 1942		Sept. 4, 1943	Sept. 5, 1942		Sept. 4, 1943	Sept. 5, 1942		Sept. 4, 1943	Sept. 5, 1942	
NEW ENGLAND												
Maine	0	0	1	------	------	------	1	16	15	2	1	0
New Hampshire	0	0	0	------	------	------	0	1	0	0	0	0
Vermont	1	0	0	------	------	------	1	29	3	0	0	0
Massachusetts	0	1	1	------	------	------	24	46	38	4	2	0
Rhode Island	0	0	0	------	------	------	8	5	3	3	0	0
Connecticut	1	0	0	------	3	------	9	15	13	4	0	0
MIDDLE ATLANTIC												
New York	5	10	8	[1] 2	[1] 4	[1] 1	100	42	57	19	8	2
New Jersey	2	2	1	2	3	3	65	12	13	1	1	0
Pennsylvania	3	4	7	------	1	------	30	15	40	14	3	2
EAST NORTH CENTRAL												
Ohio	5	10	10	------	5	4	27	31	14	8	1	1
Indiana	8	0	5	12	8	3	1	0	3	1	1	1
Illinois	5	14	10	3	2	6	22	10	10	12	3	1
Michigan [2]	6	6	6	1	2	------	86	16	16	13	0	1
Wisconsin	2	0	0	11	11	11	93	36	43	1	1	0
WEST NORTH CENTRAL												
Minnesota	3	1	2	------	1	1	16	5	5	2	1	0
Iowa	5	1	2	------	------	------	2	10	10	1	0	0
Missouri	0	3	6	1	------	------	9	4	2	5	8	0
North Dakota	1	1	2	13	5	1	13	3	3	1	0	0
South Dakota	2	3	1	------	------	------	7	3	3	0	0	0
Nebraska	4	1	0	------	------	------	0	3	2	0	0	0
Kansas	2	7	3	------	------	------	5	8	8	1	1	0
SOUTH ATLANTIC												
Delaware	1	0	0	------	------	------	0	0	0	1	0	0
Maryland [3]	1	3	1	1	4	2	17	7	4	0	2	1
District of Columbia	0	2	2	------	------	------	3	1	2	2	0	0
Virginia	5	5	15	30	44	12	7	1	4	0	1	1
West Virginia	5	1	5	------	1	3	9	0	1	2	3	1
North Carolina	27	45	45	------	------	------	10	5	12	4	2	1
South Carolina	9	12	10	152	58	90	4	0	3	1	0	0
Georgia	0	13	18	5	18	18	7	1	4	0	0	0
Florida	6	1	3	11	3	3	0	11	4	4	0	0
EAST SOUTH CENTRAL												
Kentucky	7	4	9	2	3	2	10	2	2	3	1	1
Tennessee	3	8	6	2	5	5	8	3	3	1	0	0
Alabama	6	20	18	16	26	6	5	16	16	5	0	1
Mississippi [3]	12	7	12	------	------	------	------	------	------	0	0	0
WEST SOUTH CENTRAL												
Arkansas	0	11	11	1	2	3	6	1	4	1	0	0
Louisiana	2	2	5	1	5	3	0	1	1	2	0	1
Oklahoma	1	3	7	11	1	5	11	1	2	2	0	0
Texas	18	20	25	226	103	103	46	21	27	6	2	2
MOUNTAIN												
Montana	0	2	2	------	------	------	24	10	10	0	0	0
Idaho	0	0	0	------	------	------	1	8	3	0	0	0
Wyoming	0	0	0	------	13	1	4	3	3	0	0	0
Colorado	14	3	4	11	3	3	14	4	7	0	0	0
New Mexico	1	0	1	2	------	------	4	0	1	0	1	0
Arizona	0	9	0	35	28	28	4	4	4	0	0	0
Utah [3]	0	0	0	1	3	------	2	19	8	0	0	0
Nevada	0	0	------	------	------	------	0	1	------	1	0	------
PACIFIC												
Washington	1	5	1	1	------	------	17	44	6	5	0	0
Oregon	6	1	1	2	3	4	12	49	10	5	1	0
California	18	7	10	10	20	12	54	62	62	14	2	0
Total	198	248	248	565	388	383	808	585	650	151	41	26
35 weeks	7,696	7,871	9,231	82,813	81,658	152,280	539,146	467,858	467,858	13,845	2,495	1,470

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended September 4, 1943, and comparison with corresponding week of 1942 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever [3]		
	Week ended		Median 1938–42	Week ended		Median 1938–42	Week ended		Median 1938–42	Week ended		Median 1938–42
	Sept. 4, 1943	Sept. 5, 1942		Sept. 4, 1943	Sept. 5, 1942		Sept. 4, 1943	Sept. 5, 1942		Sept. 4, 1943	Sept. 5, 1942	
NEW ENGLAND												
Maine	1	0	0	13	3	1	0	0	0	1	2	2
New Hampshire	1	0	0	2	2	1	0	0	0	1	0	0
Vermont	0	0	0	1	1	1	0	0	0	0	0	0
Massachusetts	20	1	2	47	62	28	0	0	0	2	7	4
Rhode Island	11	1	1	4	6	2	0	0	0	0	1	0
Connecticut	44	6	2	8	15	6	0	0	0	1	2	4
MIDDLE ATLANTIC												
New York	58	19	20	66	52	46	0	0	0	13	9	12
New Jersey	9	21	10	14	24	19	0	0	0	5	2	4
Pennsylvania	5	3	13	41	43	43	0	0	0	18	19	19
EAST NORTH CENTRAL												
Ohio	18	17	17	66	53	34	1	0	0	14	13	12
Indiana	3	7	6	11	7	23	0	1	0	1	9	9
Illinois	192	36	20	53	30	55	6	0	1	6	10	16
Michigan [2]	18	12	26	42	22	41	0	0	0	6	10	10
Wisconsin	18	3	7	35	53	42	0	1	0	1	1	1
WEST NORTH CENTRAL												
Minnesota	11	3	6	22	16	15	0	0	3	0	0	0
Iowa	33	1	1	13	18	17	0	0	0	2	0	2
Missouri	30	4	4	8	11	14	0	1	1	3	9	9
North Dakota	2	1	1	2	2	3	0	0	0	0	0	0
South Dakota	0	1	1	11	9	9	0	0	0	0	1	0
Nebraska	17	0	0	3	5	3	0	0	0	0	0	1
Kansas	90	5	3	18	20	27	0	0	0	5	1	4
SOUTH ATLANTIC												
Delaware	3	0	0	1	2	2	0	0	0	0	2	1
Maryland [2]	0	2	1	11	8	8	0	0	0	0	1	6
District of Columbia	0	0	1	2	5	5	0	0	0	3	0	2
Virginia	0	1	3	8	5	5	0	0	0	2	6	6
West Virginia	0	6	2	27	21	11	0	0	0	1	10	10
North Carolina	3	0	2	56	0	23	0	0	0	1	9	14
South Carolina	1	0	1	9	4	4	0	1	0	4	4	8
Georgia	1	1	2	12	12	12	0	0	0	8	6	18
Florida	0	2	3	1	5	2	0	0	0	0	4	4
EAST SOUTH CENTRAL												
Kentucky	10	3	3	14	30	29	0	0	0	8	15	20
Tennessee	2	4	4	23	19	10	0	0	0	7	18	15
Alabama	0	3	3	21	26	17	0	0	0	5	8	8
Mississippi [2]	2	3	2	6	19	8	0	0	0	11	5	9
WEST SOUTH CENTRAL												
Arkansas	1	5	2	3	1	4	0	1	0	7	5	19
Louisiana	1	0	0	0	5	5	0	0	0	4	7	13
Oklahoma	17	1	2	5	8	8	0	0	0	5	6	14
Texas	62	2	3	17	6	18	0	0	0	11	13	40
MOUNTAIN												
Montana	9	2	2	11	8	8	0	0	0	0	1	2
Idaho	0	0	1	2	2	3	0	2	0	1	1	1
Wyoming	5	0	0	6	1	1	0	0	0	0	0	1
Colorado	20	0	0	10	4	7	0	0	0	2	0	3
New Mexico	12	1	1	4	3	1	0	0	0	0	5	5
Arizona	1	2	2	2	0	0	0	0	0	3	4	2
Utah [2]	[4] 76	2	2	9	2	2	0	0	0	0	0	1
Nevada	0	0	------	2	0	------	0	0	------	0	0	------
PACIFIC												
Washington	19	2	1	14	8	8	0	0	0	5	2	3
Oregon	16	0	2	7	0	6	0	0	1	1	1	1
California	114	12	12	58	25	39	0	0	0	1	2	7
Total	[4] 956	195	479	821	683	683	7	7	16	169	231	379
35 weeks	5,887	1,902	3,009	99,317	90,442	117,978	616	621	1,988	3,655	4,498	5,784

See footnotes at end of table.

WEEKLY REPORTS FROM CITIES

Telegraphic morbidity reports from State health officers for the week ended September 4, 1943, and comparison with corresponding week of 1942 and 5-year median—Con.

Division and State	Whooping cough			Week ended Sept. 4, 1943								
	Week ended		Median 1938–42	Anthrax	Dysentery			Encephalitis, infectious	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhus fever
	Sept. 4, 1943	Sept. 5, 1942			Amebic	Bacillary	Unspecified					
NEW ENGLAND												
Maine	16	36	23	0	0	0	0	0	0	0	0	0
New Hampshire	0	1	0	0	0	0	0	0	0	0	0	0
Vermont	23	49	19	0	0	0	0	0	0	0	0	0
Massachusetts	37	134	110	0	0	3	0	0	0	0	0	0
Rhode Island	6	10	10	0	0	0	0	0	0	0	0	0
Connecticut	7	59	38	0	0	26	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York	258	342	299	1	5	98	0	1	0	3	0	0
New Jersey	127	144	96	0	1	2	0	0	0	1	0	0
Pennsylvania	133	180	309	1	0	1	0	1	0	0	0	0
EAST NORTH CENTRAL												
Ohio	123	236	209	0	0	3	0	0	0	0	0	0
Indiana	27	28	19	0	0	0	0	0	0	2	0	0
Illinois	156	270	220	0	0	1	0	0	0	0	0	0
Michigan [2]	221	279	279	0	1	20	0	0	0	0	0	0
Wisconsin	208	250	250	0	0	0	0	1	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	50	69	35	0	0	1	0	0	0	0	1	0
Iowa	73	11	23	0	0	1	0	0	0	0	0	0
Missouri	13	7	8	0	0	0	0	1	0	0	0	0
North Dakota	42	11	13	0	0	0	0	0	0	0	0	0
South Dakota	12	0	3	0	0	0	2	0	0	[4] 0	0	0
Nebraska	9	10	3	0	0	0	0	0	0	0	0	0
Kansas	31	32	37	0	0	0	0	1	0	0	0	0
SOUTH ATLANTIC												
Delaware	7	3	4	0	0	0	0	0	0	0	0	0
Maryland [2]	55	71	56	0	0	0	9	0	0	2	0	0
District of Columbia	24	10	15	0	0	0	0	0	0	0	0	0
Virginia	23	32	18	0	0	0	175	0	0	4	0	0
West Virginia	57	17	17	0	0	0	0	0	0	0	0	0
North Carolina	100	49	110	0	1	19	0	0	0	1	0	3
South Carolina	58	17	18	0	0	16	0	0	0	0	0	11
Georgia	13	36	17	0	0	3	3	0	0	1	1	36
Florida	19	11	7	0	5	0	0	0	0	0	0	9
EAST SOUTH CENTRAL												
Kentucky	23	52	29	0	0	1	0	0	0	0	0	0
Tennessee	27	27	25	0	0	0	6	0	0	1	3	0
Alabama	18	16	18	0	0	0	0	0	0	0	0	12
Mississippi [2]	------	------	------	0	0	0	0	0	0	0	0	4
WEST SOUTH CENTRAL												
Arkansas	14	5	13	0	0	14	0	0	0	0	0	0
Louisiana	6	0	6	0	0	2	0	0	0	0	0	3
Oklahoma	2	4	4	0	0	0	0	0	0	0	0	0
Texas	139	132	132	0	16	213	0	2	1	0	0	50
MOUNTAIN												
Montana	17	17	17	0	0	0	0	0	0	0	1	0
Idaho	0	7	3	0	0	0	0	0	0	0	0	0
Wyoming	1	5	3	0	0	0	0	0	0	0	0	0
Colorado	32	20	20	0	0	7	0	8	3	0	0	0
New Mexico	9	6	8	0	0	5	0	0	0	0	0	0
Arizona	13	6	7	0	0	0	57	2	0	0	0	0
Utah [2]	60	8	36	0	0	0	0	1	0	0	0	0
Nevada	2	0	------	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	64	36	23	0	0	0	0	0	0	0	0	0
Oregon	46	20	14	0	0	0	0	0	0	1	0	0
California	135	129	147	0	1	11	0	12	0	0	0	0
Total	2,536	2,894	2,894	2	30	447	252	25	1	[4] 16	6	128
35 weeks	137,429	128,043	131,769	44	1,435	11,096	2,220	475	19	383	611	2,469
35 weeks, 1942	------	------	------	60	752	6,056	4,685	361	35	399	676	2,098

[1] New York City only. [2] Period ended earlier than Saturday.
[3] Including paratyphoid fever cases reported separately as follows: New Hampshire, 1; Massachusetts, 2; New York, 3; New Jersey, 3; Michigan, 3; Georgia, 1.
[4] Exclusive of delayed report of 1 case in South Dakota for the week ended July 24, 1943.
[5] Delayed reports in Utah included.

WEEKLY REPORTS FROM CITIES

City reports for week ended Aug. 21, 1943

This table lists the reports from 87 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0	------	0	0	3	2	0	1	0	0	10
New Hampshire:												
Concord	0	0	------	0	0	0	1	0	0	0	0	0
Vermont:												
Barre	0	0	------	0	0	0	0	0	0	0	0	0
Massachusetts:												
Boston	0	0	------	0	8	1	8	1	20	0	0	27
Fall River	0	0	------	0	0	0	0	0	0	0	0	4
Springfield	0	0	------	0	1	0	0	0	6	0	0	0
Worcester	0	0	------	0	1	0	10	0	3	0	1	0
Rhode Island:												
Providence	0	0	------	0	9	1	1	6	2	0	0	13
Connecticut:												
Bridgeport	0	0	------	0	0	0	1	6	0	0	0	1
Hartford	0	0	------	0	0	0	0	1	1	0	0	0
New Haven	0	0	------	0	1	0	0	23	0	0	1	3
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0	------	0	0	3	1	4	1	0	1	8
New York	5	1	2	0	90	12	26	27	21	0	5	87
Rochester	0	0	------	0	4	2	6	0	0	0	0	4
Syracuse	0	0	------	0	3	0	1	0	0	0	0	23
New Jersey:												
Camden	0	0	------	0	0	0	1	0	2	0	1	0
Newark	0	0	------	0	12	0	3	0	0	0	0	38
Trenton	0	0	------	0	0	0	1	0	0	0	0	3
Pennsylvania:												
Philadelphia	1	0	------	1	3	2	14	1	7	0	2	70
Pittsburgh	0	0	------	0	7	1	11	1	0	0	1	16
Reading	0	0	------	0	0	0	0	0	0	0	0	9
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	0	0	------	1	6	1	2	1	4	0	2	5
Cleveland	2	0	------	0	2	1	4	3	19	0	1	44
Columbus	0	0	------	0	5	0	2	1	2	0	0	8
Indiana:												
Fort Wayne	0	0	------	0	0	0	4	0	0	0	0	1
Indianapolis	1	0	------	0	1	0	3	0	2	0	0	17
South Bend	0	0	------	0	1	0	0	0	1	0	0	0
Terre Haute	0	0	------	0	0	0	2	0	0	0	1	0
Illinois:												
Chicago	3	0	------	0	16	7	6	91	10	0	0	91
Springfield	0	0	------	0	2	0	3	0	0	0	0	0
Michigan:												
Detroit	5	0	------	0	10	3	3	0	5	0	1	73
Flint	0	0	------	0	1	0	0	0	1	0	0	2
Grand Rapids	0	0	------	0	10	1	1	0	0	0	0	20
Wisconsin:												
Kenosha	0	0	------	0	2	0	0	0	0	0	0	4
Milwaukee	0	0	------	0	8	1	1	0	3	0	0	82
Racine	0	0	------	0	1	0	0	0	1	0	0	4
Superior	0	0	------	0	16	0	0	0	0	0	0	4
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0	------	0	14	0	0	2	0	0	0	14
Minneapolis	0	1	------	0	0	0	0	3	6	0	0	8
St. Paul	1	0	------	0	3	0	3	5	1	0	0	31
Missouri:												
Kansas City	0	0	------	0	2	0	8	5	3	0	0	8
St. Joseph	0	0	------	0	0	0	0	1	0	0	1	0
St. Louis	0	1	1	0	5	1	1	0	3	0	3	24

City reports for week ended Aug. 21, 1943—Continued

City reports for week ended Aug. 21, 1943—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
North Dakota:												
Fargo	1	0	------	0	1	0	0	1	0	0	0	3
Nebraska:												
Omaha	3	0	------	0	0	0	1	3	0	0	0	1
Kansas:												
Topeka	0	0	------	0	0	0	0	2	0	0	0	1
Wichita	0	0	------	0	0	0	7	7	2	0	0	8
SOUTH ATLANTIC												
Delaware:												
Wilmington	1	0	------	0	1	2	2	0	0	0	0	2
Maryland:												
Baltimore	1	0	1	1	14	6	6	0	2	0	0	60
Cumberland	0	0	------	0	0	0	0	0	0	0	0	1
Frederick	0	0	------	0	0	0	0	0	0	0	0	0
District of Columbia:												
Washington	0	0	------	0	6	2	9	0	4	0	1	17
Virginia:												
Lynchburg	0	0	------	0	27	0	3	0	0	0	0	11
Richmond	0	0	------	0	9	1	3	0	0	0	0	2
Roanoke	0	0	------	0	0	0	0	0	0	0	0	0
West Virginia:												
Wheeling	0	0	------	0	0	0	1	0	0	0	1	4
North Carolina:												
Winston-Salem	3	0	------	0	0	0	0	0	2	0	0	11
South Carolina:												
Charleston	0	0	------	0	0	0	0	0	0	0	0	0
Georgia:												
Atlanta	3	0	4	0	1	0	1	0	1	0	1	2
Brunswick	0	0	------	0	0	0	0	0	1	0	0	0
Savannah	0	0	------	0	0	0	1	0	0	0	0	0
Florida:												
Tampa	0	0	------	0	0	0	1	0	0	0	0	0
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	0	0	------	0	0	0	7	0	0	0	1	14
Nashville	0	0	------	0	0	0	0	0	0	0	0	13
Alabama:												
Birmingham	0	0	------	0	1	0	6	0	0	0	0	0
Mobile	1	0	------	1	1	0	2	0	1	0	0	0
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0	------	0	0	0	1	0	0	0	0	0
Louisiana:												
New Orleans	0	0	7	0	1	0	10	7	2	0	2	2
Shreveport	0	0	------	0	0	0	5	0	0	0	0	0
Texas:												
Dallas	0	0	------	0	1	0	3	18	0	0	3	8
Galveston	0	0	------	0	0	0	1	0	1	0	0	0
Houston	2	1	------	0	4	0	4	2	1	0	0	1
San Antonio	1	0	------	0	3	0	4	0	0	0	2	1
MOUNTAIN												
Montana:												
Billings	0	0	------	0	1	0	1	0	0	0	1	0
Great Falls	0	0	------	0	3	0	0	0	1	0	0	4
Helena	0	0	------	0	0	0	0	0	0	0	0	0
Missoula	0	0	------	0	0	0	0	0	0	0	0	0
Idaho:												
Boise	0	0	------	0	0	0	0	0	0	0	0	0
Colorado:												
Denver	2	0	2	0	3	0	1	5	2	0	0	30
Pueblo	0	0	------	0	1	0	2	2	0	0	0	0
Utah:												
Salt Lake City	0	0	------	0	2	0	1	4	2	0	0	9

City reports for week ended Aug. 21, 1943—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle	0	0	------	0	12	0	0	1	1	0	0	19
Spokane	0	0	------	0	1	0	0	0	4	0	0	6
Tacoma	0	0	------	0	1	0	0	0	0	0	0	0
California:												
Los Angeles	1	0	4	1	21	0	3	27	8	0	1	27
Sacramento	0	0	------	0	0	0	2	18	0	0	0	2
San Francisco	0	0	------	0	8	0	6	5	6	0	0	13
Total	37	4	21	5	367	51	224	284	166	0	34	1,029
Corresponding week, 1942	40	7	24	7	195	17	229	46	180	1	27	1,249
Average, 1938-42	52	------	28	[1] 7	[2] 215	------	[1] 221	------	188	2	52	1,274

Anthrax.—Cases: Philadelphia, 1.

Dysentery, amebic.—Cases: Boston, 2; New York, 1; Philadelphia, 1; Detroit, 1.

Dysentery, bacillary.—Cases: Buffalo, 5; Philadelphia, 1; Cincinnati, 6; Cleveland, 1; St. Louis, 4; Baltimore, 6; Charleston, S. C., 7; Los Angeles, 7.

Dysentery, unspecified.—Cases: Cleveland, 4; Baltimore, 1; Richmond, 1; San Antonio, 4.

Rocky Mountain spotted fever.—Cases: Philadelphia, 1; St. Louis, 1; Nashville, 1.

Typhus fever.—Cases: Wichita, 1; Savannah, 5; Dallas, 6; Galveston, 2; Houston, 4; San Antonio, 4; Los Angeles, 1.

[1] 3-year average, 1940-42.
[2] 5-year median.

Rates (annual basis) per 100,000 population, by geographic groups, for the 87 cities in the preceding table (estimated population, 1942, 34,314,400)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
NEW ENGLAND	0.0	0.0	0.0	0.0	49.7	12.4	57.1	91.9	82.0	0.0	5.0	144
MIDDLE ATLANTIC	2.7	0.4	0.9	0.4	53.1	8.9	28.5	14.7	13.8	0.0	4.5	115
EAST NORTH CENTRAL	6.4	0.0	0.0	0.6	47.3	8.2	18.1	56.1	28.0	0.0	2.9	208
WEST NORTH CENTRAL	9.8	3.9	2.0	0.0	48.9	2.0	39.1	56.7	29.3	0.0	7.8	192
SOUTH ATLANTIC	14.2	0.0	8.9	1.8	102.9	19.5	47.9	0.0	17.7	0.0	5.3	195
EAST SOUTH CENTRAL	5.9	0.0	0.0	5.9	11.9	0.0	89.1	0.0	5.9	0.0	5.9	160
WEST SOUTH CENTRAL	8.8	2.9	20.5	0.0	26.4	0.0	82.1	79.2	11.7	0.0	20.5	35
MOUNTAIN	16.1	0.0	16.1	0.0	80.4	0.0	40.2	88.4	40.2	0.0	8.0	346
PACIFIC	1.7	0.0	7.0	1.7	75.2	0.0	19.2	89.1	33.2	0.0	1.7	117
Total	5.6	0.6	3.2	0.8	55.3	7.7	33.7	42.8	25.0	0.0	5.1	155

PLAGUE INFECTION IN MONO COUNTY, CALIFORNIA

Plague infection has been reported proved in tissue from 9 chipmunks (*Eutamias* sp.) taken July 19, 1 mile east and 4 miles south of June Lake, Mono County, Calif.

SWITZERLAND

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended August 7, 1943.—During the week ended August 7, 1943, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox	1	10	1	23	61	11	15	17	26	165
Diphtheria		5		15		1		1		22
Dysentery (bacillary)				1		1				2
Encephalitis, infectious							1			1
German measles				1	15			6	6	28
Influenza					7				1	8
Measles		22	1	1	171	24	15	72	65	371
Meningitis, meningococcus					2	2	1	1		6
Mumps		8		14	86	12	6	26	14	166
Poliomyelitis		1		3	1					5
Scarlet fever	1	3	1	30	49	16	6	15	16	137
Smallpox							2			2
Tuberculosis (all forms)	3		22	124	38	3	14	12	31	247
Typhoid and paratyphoid fever			1	19						20
Undulant fever				8		1			2	11
Whooping cough				74	127	23	19	57	32	332

NEW ZEALAND

Vital statistics—Year 1942–43.—Following are the vital statistics for New Zealand for the year 1942–43 as published by the Director-General of Health:

	Number	Rate per 10,000 population		Number	Rate per 10,000 population
Live births	33,574	[1] 21.73	Deaths from:—Continued.		
Stillbirths		[2] 26.54	Heart disease	5,625	36.41
Deaths		[1] 10.60	Hernia and intestinal obstruction	114	.74
Deaths of infants		[2] 28.71	Influenza (including pneumonia)	248	1.61
Maternal mortality		[2] 2.53	Measles	31	.20
Deaths from:			Pneumonia	235	1.52
Appendicitis	68	.44	Scarlet fever	1	.01
Bright's disease	493	3.19	Senility	468	3.03
Bronchitis	210	1.36	Tuberculosis (all forms)	607	3.93
Bronchopneumonia	326	2.11	Typhoid and paratyphoid fever	8	.05
Cancer	2,020	13.07	Violence	891	5.77
Cerebral hemorrhage	1,530	9.90	Whooping cough	4	.03
Diabetes	352	2.28			
Diarrhea and enteritis	78	.50			
Diphtheria	24	.16			
Diseases of the arteries	188	1.22			

[1] Per 1,000 population.

[2] Per 1,000 live births.

Spain.—Typhus fever has been reported in Spain as follows: For

SWITZERLAND

Notifiable diseases—January–March 1943.—During the months of January, February, and March 1943, cases of certain notifiable diseases were reported in Switzerland as follows:

Disease	January	February	March
Cerebrospinal meningitis	5	10	13
Chickenpox	215	144	256
Diphtheria and croup	235	218	256
Dysentery	2	7	25
German measles	10	11	19
Hepatitis, epidemic	219	182	187
Influenza	73	60	65
Leprosy			1
Measles	150	138	315
Mumps	152	212	334
Paratyphoid fever	14	3	5
Poliomyelitis	6	5	4
Scarlet fever	214	172	236
Trachoma		1	
Tuberculosis	268	327	441
Typhoid fever	16	7	6
Undulant fever	3	3	22
Whooping cough	76	94	138

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual prevalence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during the current year. All reports of yellow fever are published currently.

A cumulative table showing the reported prevalence of these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

(Few reports are available from the invaded countries of Europe and other nations in war zones.)

Plague

Indochina—Cochinchina.—For the period July 21–31, 1943, 1 fatal case of plague was reported in Cochinchina, Indochina.

Smallpox

Algeria.—Smallpox has been reported in Algeria as follows: July 11–20, 1943, 39 cases; July 21–31, 1943, 30 cases.

Indochina.—Smallpox has been reported in Indochina as follows: July 11–20, 1943, 107 cases; July 21–31, 1943, 111 cases.

Turkey.—Smallpox has been reported in Turkey as follows: Week ended July 10, 1943, 150 cases; week ended July 17, 1943, 133 cases; for the period August 1–15, 1943, 283 cases.

Typhus Fever

Algeria.—Typhus fever has been reported in Algeria as follows: July 11–20, 1943, 94 cases; July 21–31, 1943, 115 cases.

Rumania.—For the 2 weeks ended August 21, 1943, 84 cases of typhus fever were reported in Rumania.

Slovakia.—During the week ended August 7, 1943, 22 cases of typhus fever were reported in Slovakia.

Spain.—Typhus fever has been reported in Spain as follows: For the 2 weeks ended July 3, 1943, 25 cases; week ended July 10, 1943, 11 cases.

Tunisia.—For the period July 11–20, 1943, 50 cases of typhus fever were reported in Tunisia, including 13 cases reported in Tunis.

Turkey.—Typhus fever has been reported in Turkey as follows: Week ended July 10, 1943, 113 cases; week ended July 17, 93 cases; August 1–15, 1943, 206 cases.

Yellow Fever

Brazil—Para State—Ponta de Pedras.—On July 8, 1943, 1 death from yellow fever was reported in Ponta de Pedras, Para State, Brazil.

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